BAT list: Evolution
Chapters 10 & 11

Evolution Unit Vocabulary

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Convergent evolution	Evolution	Divergent evolution	Embryology
Biogeography	Genetic drift	Gradualism	Charles Darwin
Natural selection	Vestigial structure	Homologous structure	Gene flow
Analogous structure	Gene pool	Comparative anatomy	Phylogeny
Punctuated equilibrium	Speciation	Coevolution	Diversity
Mutation	Allelic frequency		

Ch 10.2 Darwin's Observations (pg 290-291 in online textbook)

1. What accounts for the variations among species that Darwin observed? Adaptations

2. What is an adaptation? A change made to better survive – usually involves a trait that is beneficial

3. What adaptations did Darwin observe in the finches of the Galapagos Islands? Beak structure changed as food source changed

4. Explain what is meant by descent with modification. As organisms evolve, they change to better suit environment

5. Explain how the sequential nature of fossil groups found in rock strata supports Darwin's principle of descent with modification.
   Fossils change as layers and environment changes

6. Based on your knowledge of the Law of Superposition, identify A) which fossil is the oldest and the youngest and B) what information can be learned about the environment from the fossils present.
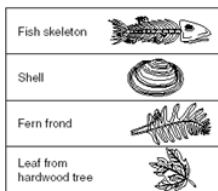
A) oldest on bottom layer, youngest on top

B) the type of environment it was
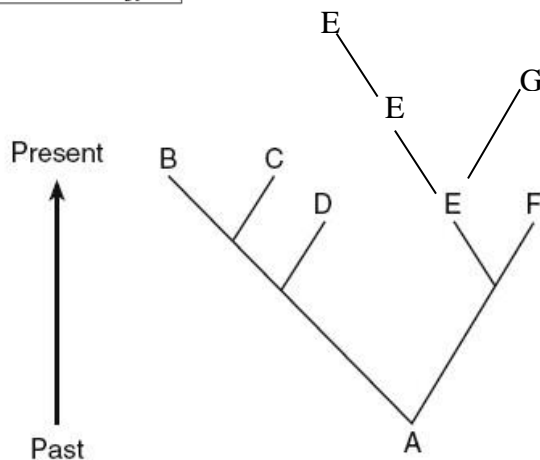
Which species was the best adapted for survival? E – it survived the longest

7. What could account for fossils of marine organisms being found on top of modern-day mountain ranges? Area was once covered in water

Ch 10.3 Theory of Natural Selection (pg 290-291 in online textbook)

8. What is natural selection? One trait on a species begins to show up more because it is selected for survival, those that do not benefit are selected to die (eaten, etc)

9. What is an example of artificial selection (human caused evolution)? Spraying pesticides resulting in only insects with resistant genes surviving (caused by "natural" selection); poachers killing tusked elephants leaving tuskless to reproduce

10. Why must there be variation within a population for natural selection to occur? There has to be a variety of a trait so only certain ones are selected for, leaving the beneficial traits in the gene pool. An example of variation within a species could be rabbits that are different sizes (small, medium, large)

11. How do the structural and the physiological adaptations of organisms support natural selection? Natural selection acts on the phenotypes, not the genotypes of an organism. These traits are favored during environmental change and selected for survival

12. How does natural selection relate to adaptations and the development of diversity in and among species? As natural selection occurs, adaptations are passed on/ diversity allows for natural selection to not affect all organisms in a population

Ch 10.4 Evidence of Evolution (pg 298-304)

13. Compare homologous, analogous, and vestigial structures. H- started off same structure in common ancestor then adapted to suit different environments, A- very different structures that have the same function, V- no longer serve a purpose in the organism

14. Identify the structures below as analogous, homologous, or vestigial.

Vestigial   Homologous   Analogous

15. Given an example of a vestigial structures and explain how they are critical evidence for evolution? Whale's pelvis, evidence they once had hind limbs

16. What type of evidence of evolution is MOST accurate in terms of determining how related organisms are? DNA

17. How has biotechnology, specifically gel electrophoresis and DNA, added to our understanding of evolution? Similarities show close relationships, differences show distant relationships

18. Using the DNA fingerprint below, which deer is most closely related to the common ancestor? Deer 3 Explain how you know. Has the most bars in common

Ch 11.1 Genetic Variations within Populations (pg 316-317)

19. What is the ultimate source of genetic variation? mutations

20. What is a gene pool? The genes in a population

21. What is allele frequency? The percent of alleles present, how prevalent or rare a trait is

22. Why does genetic variation increase the chance that some individuals in a population will survive? Genetic diversity allows for some genes to be beneficial when others may lead to death.

23. How does crossing over in meiosis provide a source of genetic variation? Crossing over "mixes" the genes creating diversity

Ch 11.2 Natural Selection in Populations (pg 318-321)

24. Sketch and label each graph for punctuated equilibrium, gradualism, divergent evolution and convergent evolution. Include a short description of each.
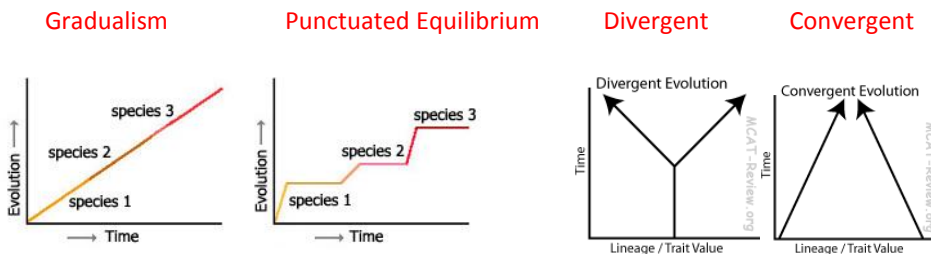
25. Does natural selection produce changes in populations or in individuals and why? Populations! Individuals don't evolve

26. Why is it said that natural selection acts on the phenotypes rather than on the genetic material of organisms? Phenotypes are the actual traits being used for survival, genes just code for them

Ch 11.3 Other Mechanisms of Evolution (pg 323-325)

27. What is gene flow? Genes and traits moving from one population to another population leading to genetic variation

28. Describe how gene flow can increase genetic variation within two neighboring populations. Different traits are brought in from another population

29. How can a lack of gene flow between populations lead to speciation? With no "sharing" of traits, populations may have different mutations that are successful and lead to adaptations in an environment until they are different

30. What is genetic drift? Change in allele frequency due to randomness in one population.

31. Explain why mutation and genetic drift are random events while natural selection is not. There's no regulating which trait is selected for.

32. How do genetic drift, gene flow, mutation and recombination affect the gene pool? Increases genetic diversity/ changes it

33. Would a population with a lot of genetic variation or a little genetic variation be more likely to have individuals that can adapt to a changing environment? Explain your answer. A lot, more chance the trait leading to survival exists

Ch 11.6 Speciation through Isolation (pg 332-335)

34. What is convergent evolution? Different species develop similar traits allowing them to occupy same niche. (Dolphin & Shark)

35. What is divergent evolution? Same or similar species adapting and changing to survive in different environments

36. Which type of structures (homologous or analogous) are representative of convergent evolution? analogous

37. Which type of structures (homologous or analogous) are representative of divergent evolution? homologous

38. What is co-evolution? Two species evolving together to continue symbiotic relationship (predator, prey or pollinator and flower)

39. How are predator-prey relationships an example of co-evolution? As prey changes to escape predator, predator changes to

    catch prey

40. Explain the theory of gradualism. Slow and steady changes over a continuous period of time

41. Sketch the graph that represents gradualism. See #25

42. Explain the theory of punctuated equilibrium. Long period no change, rapid change, long period of no change, rapid change etc

43. Sketch the graph that represents punctuated equilibrium See #25

44. Use the cladogram below to answer the questions
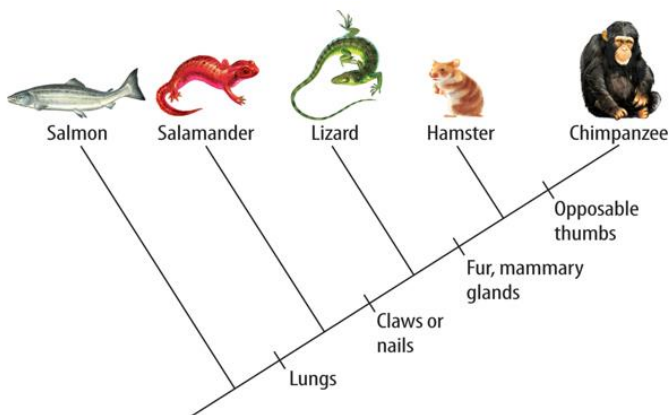
a. Which organism(s) do not have lungs? salmon

b. Which organism(s) have fur and mammary glands? chimpanzee

c. Would all of these organisms have a common ancestor? No/yes Why or why not? This cladogram shows none . . .but they did

A few other things to review:

Speciation – over a long period of time a single species develops into several different species. May occur when portion of population is isolated

Evidence of Evolution showing we came from a common ancestor:

    Embryology

    Fossil Record

    DNA comparison

    Biogeography

    Anatomical structures (homologies)

Gel Electrophoresis:

Restriction Enzymes are used to cut DNA (enzymes end in – ase)

The more bands/bars in common the closer the relationship, the less the further the connection

Used for paternity tests, identifying suspects, etc